

III. *Poison-glands*.—Among the pluricellular alveoli of the salivary glands we find a certain number of bulky pyriform cells, which are distinguished from the other gland-cells by their affinity for the acid stains. Studying these cells at different stages, I perceived that they form unicellular glands, which open into the salivary ducts by a short canal. These glands are situated exclusively upon the three great trunks of the excretory canals. I consider these histological elements to be poison-glands; they are, moreover, much more numerous in the species of *Argas* than in those of *Ixodes*, a fact which explains easily enough the greater degree of irritation caused by the bite of the former when compared with that inflicted by the latter.

In the resting condition (that is to say, in individuals which have been detached from their host for a certain time) the nucleus of these cells is regular in shape, rounded, and sharply defined. At the moment of secretory activity the nuclear membrane disappears, and the nucleus sends out irregular prolongations, especially on the side of the aperture of the gland. These prolongations become detached from the central mass, and break up into nuclear granulations which are entirely identical with the venogenous granules observed in the poison-glands of Arthropods and snakes.

The cytoplasm stains readily with eosin, and is finely granular. Nevertheless, around the nucleus and the nuclear granulations it exhibits a hyaline zone of slight plasmic density; this zone is more or less extensive, according to the bulk of the mass of chromatin contained in it. The chromatic granulations appear to dissolve in the cytoplasm, and modify it in order to produce the toxic substances.

It seemed to me interesting to notice these nuclear emissions, which here undoubtedly play a highly important part in the phenomena of secretion, and probably participate in the formation of poison in the gland, as Launoy, in his researches upon poison-glands, has shown to be the case.—*Comptes Rendus*, t. cxlii. no. 5 (Jan. 29, 1906), pp. 296-298.

The Large Dermal Glands of the Species of Echinaster.

By Dr. PHILIPP BARTHELS.

In his work "Die Seesterne des Mittelmeeres" ('Fauna und Flora des Golfes von Neapel,' Bd. 24, 1897) Ludwig speaks on page 320 of the large dermal glands of the species of *Echinaster*; he describes their occurrence especially in *Echinaster sepositus*, Gray, and says that in their longest diameter the glands measured from 0.6 to 0.8 mm. After the removal of the epithelium covering the body he was already able to recognize the glands with the help of a lens, by means of the white coloration in the large meshes of the cutis, by which each one is surrounded. They had sometimes a rounded and sometimes a more elongate outline, or one in which

the angles were rounded off. Ludwig found the glands in very large numbers, upon the disk as well as upon the arms, extending close up to the ambulacral grooves, and in general situate upon the area of the body supported by the skeletal plates; he failed to find them in the central portion of the pore-fields, between the papulae. Ludwig adds that the same glands also occur in other species of *Echinaster* (e. g. in *Echinaster cullosus* and *Cribrella oculata*). With reference to the finer structure of the glands, Ludwig refers to Cuénot's paper, "Contribution à l'étude anatomique des Astérides" (Arch. Zool. expér. [2] t. 5 bis, 1888, pp. 11-13, pl. i. figs. 15-17).

In the sections that he made of *Echinaster sepositus* Cuénot found that the glands were of irregular shape, 0.5 mm. in length, more or less spherical, enveloped by the fibrillar layer beneath the epithelium of the body; the aperture appeared as a shallow depression. Cuénot further states that in the gland there are meshes of connective tissue, surrounding oval spaces, and that in each mesh there lies a large cell, which forms the vesicles that are found in the cell and in the ejected mucus.

I studied the glands in very small specimens of *Echinaster sepositus* which Herr Geheimrath Ludwig most kindly gave me and in larger animals which I had preserved at Naples; besides these I also made use of *Cribrella oculata* (= *sanguinolenta*) from the Plymouth Biological Laboratory.

In young animals the origin of the glands at the tips of the arms can be clearly seen. They are formed by means of the invagination of the epithelium of the body; the primitive gland is a wide open invagination; the neck gradually becomes narrower and the gland assumes the typical form. The cells of the external epithelium which have thus sunk inwards multiply greatly and lose their regular arrangement: the new cells become detached and are pressed into the lumen of the gland; in the case of *Echinaster sepositus* they are some 11 to 15 μ in size, and in that of *Cribrella oculata* about 13 to 19 μ , generally not quite round, but somewhat elongate; the roundish nuclei of these cells measure approximately 2 μ . Between the parietal cells and those that are free only a slight difference in shape is perceptible; here and there among the fixed cells are to be found some that are in process of division. By the bursting of the free cells the mucus is poured into the gland; the small nuclei are mingled with it. The glands are surrounded by strong fibres of connective tissue, but nowhere is any connective tissue to be found in the interior of the gland.

If a starfish of this kind is irritated and the skin contracts, the mucus exudes from the affected spot in small droplets, and investigators are unanimously of the opinion that these glands of the species of *Echinaster* serve as organs of defence.—*Zoologischer Anzeiger*, Bd. xxix. No. 20 (Jan. 8, 1906), pp. 639-640.